



## Elkhorn Coral and White Pox: An Answer and More Questions

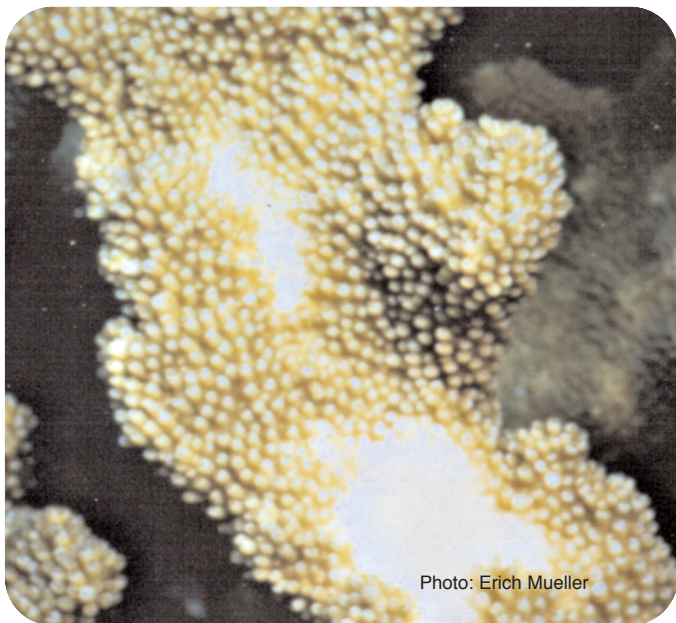
Margaret W. Miller, Ph D., NOAA-Fisheries, Ecologist

Coral diseases and syndromes (for which the cause of disease-like signs has not been identified) have become recognized in recent years as contributing to coral decline throughout the Caribbean. In the past five years, dramatic increases in the number of diseases and syndromes and the number of affected coral species have been documented in the Florida Keys National Marine Sanctuary (FKNMS). Unfortunately, very few of the specific biological pathogens (or germs) that cause coral disease have been identified and this lack of knowledge inhibits management strategies to mitigate disease effects. Recently, there has been much public attention given to a scientific publication describing an important advance in coral disease study, "The etiology of white pox, a lethal disease of the Caribbean elkhorn coral, *Acropora palmata*", (Proceedings of the National Academy of Sciences). This recent work on white pox is an important advance because it adds one specific coral pathogen to this short list: the common bacterium *Serratia marcescens*, which causes "white pox" disease of elkhorn coral, *Acropora palmata*.



**White band disease, not white pox, is the dominant disease affecting elkhorn coral in the Keys. Its specific pathogen has not been identified. Elkhorn corals and other corals appear to be affected by multiple stressors, including bleaching during times of high sea surface temperatures and poor water quality.**

Much emphasis has been placed on the fact that this bacterium resides in the human gut (and therefore, in sewage) and of the possible linkage between a coral pathogen and human sewage inputs into the Keys' coastal environment. Elkhorn coral has undergone huge declines in recent years, so much so that NOAA's National Marine Fisheries Service considers it a candidate for listing under the Endangered Species Act. It is tempting to believe that a simple explanation (human sewage contamination) and a relatively simple "fix" (sewage treatment) might exist. However, there are two factors that make this simple explanation incomplete. First, the bacterium identified as the white pox pathogen is extremely common in all sorts of natural environments and other organisms. There may even be some growing in your shower! So far, only the *identity* of the pathogenic bacterium has been determined, not its *source*. It may come from other reef organisms such as fish or snails that naturally co-exist and interact with (and deposit their waste directly on) elkhorn coral. This crucial question of the source of the pathogenic bacteria infecting elkhorn coral colonies is a topic that requires further and timely research attention.



**White pox disease is evident as white spots on the branches of elkhorn coral colonies (above). The bacteria identified as the white pox pathogen is found in many natural environments.**

However, a "natural" (i.e., non-human) source of the bacterium is still cause for concern as it might suggest that other sources of physiological stress to the coral (such as global warming or poor water quality) make it susceptible to an otherwise benign microbe in its

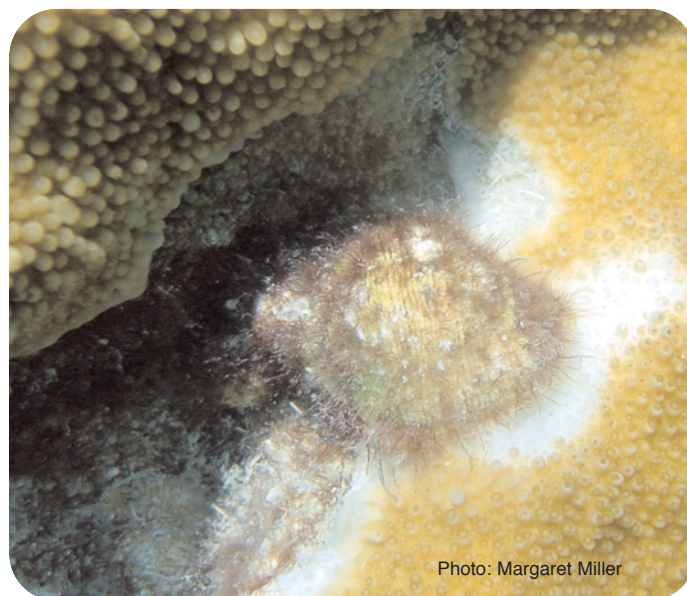
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environment. Thus, we must continue to minimize human contribution to the multiple stressors affecting corals and continue investigation into their singular and synergistic effects.

Additionally, there are many causes and mechanisms of elkhorn coral decline. Disease has been recognized as a major elkhorn-killer throughout the Caribbean region since the early 1980's. However, "white band disease" (not "white pox") was, and probably still is, the dominant disease affecting elkhorn coral and its specific pathogen remains elusive. There are also organisms such as snails that actively prey upon live elkhorn coral tissue. Periodic coral bleaching events and hurricanes have impacted elkhorn coral in the Keys, most recently in 1998, and no doubt will continue to do so. Likewise, multiple vessel groundings in the Sanctuary have damaged elkhorn coral, as does the coral pecking and algal-gardening behaviors of three-spot damselfish. We know that all of these factors contribute to the decline of elkhorn corals in the Sanctuary. Unfortunately, we do not know the relative importance of each source of elkhorn loss. This is the other crucial research question that must be addressed in order to discern what is a reasonable expectation regarding the benefits of any particular management strategy for elkhorn coral recovery.



**Snail predation is a natural factor affecting elkhorn corals. Two snails, each with its algae-covered shell, are visible in the middle of the white grazed area.**

We know that implementation of effective waste water treatment in the Keys is a vital undertaking for preserving the quality of our sensitive marine environment. The ongoing **Water Quality Protection Program**, a cooperative effort of the Sanctuary, the Environmental Protection Agency, the State of Florida, and Monroe County has taken great strides in planning and implementing this goal, including the development of the Monroe County wastewater treatment master plan and implementation of wastewater improvements in Key West and Little Venice, Marathon. Clear benefits for coastal ecosystems will accrue from reduced human inputs of nutrients and contaminants from sewage and stormwater runoff. However, it is premature to expect that wastewater treatment is likely, on its own, to solve the problem of elkhorn coral loss.

Note: This article appeared in the Fall 2002 Issue of the newsletter of the Florida Keys National Marine Sanctuary, **Sounding Line**. For more information, visit: [floridakeys.noaa.gov](http://floridakeys.noaa.gov).

### NOAA's Coral Health and Monitoring Program (CHAMP)

For more information about coral disease, visit the NOAA CHAMP website at [http://www.coral.noaa.gov/coral\\_disease](http://www.coral.noaa.gov/coral_disease). This website, designed for use by both scientists and non-scientists, provides easy access to information about coral diseases. The website also offers links to pertinent scientific literature and to the **Coral Disease and Health Consortium**, created by the National Coral Reef Task Force in January of 2002. The purpose of the Consortium is to organize and coordinate the scientific resources of the U.S. and its territories to meet the challenge of globally declining coral reefs.